BOTTOM REVERBERATION DATA ANALYSIS AND PROPAGATION MODELING OF COMPLEX MULTIPATHS

Kevin B. Smith
Department of Physics, Code PH/Sk
Naval Postgraduate School
Monterey, CA 93943
phone: (408) 656-2084 fax: (408) 656-2834 email: kevin@usw.nps.navy.mil
Award #: N0001497WR30004

LONG-TERM GOAL

The overall goal of this project is to improve our understanding of long-range, low-frequency reverberation. Of particular interest to me were the effects of multipaths on our ability to identify specific scatterers or scattering locations.

SCIENTIFIC OBJECTIVES

The objective of this work is to quantify the significance of multipaths on monostatic reverberation from distant scattering patches.

APPROACH

Data taken from the area of B' in the ARSRP Natural Lab will be examined in the context of multipath influences. A version of the University of Miami Parabolic Equation (UMPE) model (Smith and Tappert, 1993) will be used in conjunction with Tappert's PE Reverberation (PEREV) model (Tappert, 1993). Bathymetric data for this region and sound speed profiles from CTD casts were also available for modeling purposes.

WORK COMPLETED

This was the final phase of a multi-year effort to employ numerical modeling to aid in our understanding of the generation of long-range reverberation. For this work, a set of fully coherent, broadband calculations were made to provide the most accurate predictions of the influence of multipaths on reverberation.

RESULTS

The data displayed in Figure 1 show the comparison between this new, coherent broadband prediction and the previous, more typical, CW type prediction. Two points are of considerable interest. First, the broadband calculation shows how multipaths can increase predicted reverberation levels in "CW shadow zones" by as much as 20 dB. This

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
30 SEP 1997		**00-00-1997 to 00-00-1997**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Bottom Reverberation Data Anlaysis and Propagation Modeling of Complex Multipaths	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Naval Postgraduate School,Department of Physics,Monterey,CA,93943**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**3**	

broadband calculation was also found to be more consistent with the measured data. Secondly, it is worth noting that for much of the predicted reverberation signal, the CW method works quite well. Therefore, some intermediate approach may be most useful which takes advantage of the efficiency of the CW method but is able to fill in such shadow zones in a maner consistent with multipath propagation.

IMPACT/APPLICATION

The significance of multipath influences on reverberation should not be ignored. However, careful treatment of quicker, CW results may provide adequate predictions of reverberation in most tactical situations.

TRANSITIONS

None at this time.

RELATED PROJECTS

1 - Fred Tappert (NPS) has performed similar comparisons of reverberation predictions with measured data.

REFERENCES

Smith, K.B. and Tappert, F.D., "UMPE: The University of Miami Parabolic Equation Model, Version 1.0," Marine Physical Laboratory Technical Memo 432, 1993.

Tappert, F.D., "Physics of the PE Reverb Model," ONR-ARSRP Symposium, La Jolla, CA, March 23- 25, 1993.

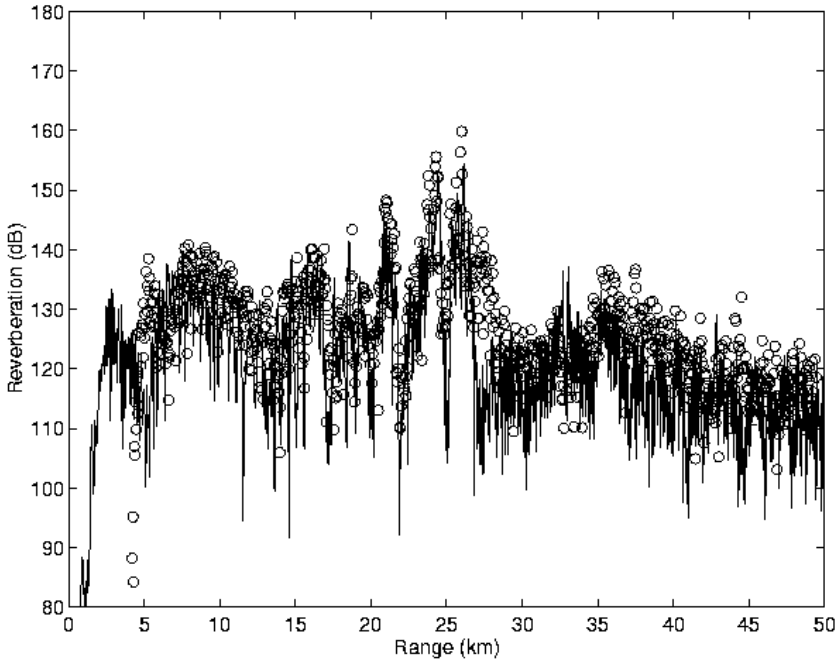

Figure 1: Comparison of reverberation prediction techniques:
CW approach (solid line) and two-way travel time technique (circles).